DURUM WHEAT

QUALITY REPORT

Physical, Chemical, Milling, and Macaroni Characteristics

1968 CROP

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
CROPS RESEARCH DIVISION
and
NORTH DAKOTA AGRICULTURAL EXPERIMENT STATION
DEPARTMENT OF CEREAL TECHNOLOGY

UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE
CROPS RESEARCH DIVISION
in cooperation with
State Agricultural Experiment Stations

QUALITY EVALUATION OF DURUM WHEAT VARIETIES

1968 CROP[1/]

by

W. C. Shuey, Research Technologist; V. L. Youngs, Research Chemist; K. J. Sprick, Chemist; R. D. Crawford, R. D. Maneval, and N. B. Lofthus, Technicians; Crops Research Division, Agricultural Research Service; and K. A. Gilles, Chairman; L. D. Sibbitt, D. E. Walsh, M. H. Boeder, and S. Vasiljevic, Department of Cereal Chemistry and Technology, North Dakota Agricultural Experiment Station.

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This report was compiled in the Crops Research Division, Agricultural Research Service, U.S. Department of Agriculture. Special acknowledgment is made to the North Dakota State University for their facilities and services provided in support of these studies. The report is not intended for publication and should not be referred to in literature citations or quoted in publicity or advertising. Use of the data may be granted for certain purposes upon written request to the agency or agencies involved.

Hard Red Spring and Durum Wheat Quality Laboratory
Fargo, North Dakota
CR-36-69
May, 1969

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AGRICULTURAL RESEARCH SERVICE
CROPS RESEARCH DIVISION
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QUALITY EVALUATION OF DURUM WHEAT VARIETIES

1959 CROP[1/]

by

W. C. Shuey, Research Technologist; V. L. Youngs, Research Chemist; K. J. Sprick, Chemist; R. D. Crawford, R. D. Maxwell, and W. R. Leftwich, Technicians; Crops Research Division, Agricultural Research Service; and K. A. Gilles, Chairman; L. D. Stabile, D. E. Walsh, H. E. Bowder, and S. Vasiljevic, Department of General Chemistry and Technology, North Dakota Agricultural Experiment Station.

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Hard Red Spring and Durum Wheat Quality Laboratory
Fargo, North Dakota
CR-16-59
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COOPERATING AGENCIES, STATIONS, AND PERSONNEL

The cooperating agencies, stations, and personnel conducting the varietal plot and nursery experiments concerned with these durum tests in 1968 were as follows:

Minnesota Agricultural Experiment Station
Crookston, Morris, and St. Paul: R. E. Heiner*, J. R. Lofgren, and Roy Thompson.

Montana Agricultural Experiment Station
Bozeman, Creston, Havre, Huntley, Moccasin, and Sidney: F. H. McNeal*, M. A. Berg*, H. R. Guenthner, G. P. Hartman, D. E. Baldridge, R. T. Lewellen, and V. R. Stewart.

North Dakota Agricultural Experiment Station
Carrington, Dickinson, Fargo, and Williston: K. L. Lebsock*, T. J. Conlon, E. French, H. Olson, R. R. Nowatzki, and Al Schneiter.

Oregon State University
Moro and Pendleton: W. H. Foote, C. R. Rohde, and J. T. McDermid.

South Dakota Agricultural Experiment Station
Brookings, Centerville, Eureka, Highmore, Wall, and Watertown: D. G. Wells, Q. Kingsley, G. Bucheneau, J. J. Bonneman, F. J. Holmes, L. Schearer, and A. Dittman.

Washington State University
Ellensburg, Othello, and Pullman: Lawrence Bacon, John Dickey, and C. F. Konzak.

* ARS Employees

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The cooperating agencies, stations, and personnel conducting the varietal plot and nursery experiments concerned with these durum tests in 1968 were as follows:

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Crookston, Morris, and St. Paul: E. E. Hafner*, J. M. Lofgren, and Roy Thompson.

Montana Agricultural Experiment Station
Bozeman, Creston, Havre, Huntley, Moccasin, and Sidney:
F. H. McNeal*, M. A. Berg*, H. E. Quentmer, C. F. Hartman, D. E. Baldridge, W. T. Lewellen, and V. E. Stewart.

North Dakota Agricultural Experiment Station
Carrington, Dickinson, Fargo, and Williston: K. L. Lebsock*, I. J. Canton, E. Trenk, H. Olson, E. E. Nowacki, and Al Schmaltz.

Oregon State University
Moro and Pendleton: W. H. Foote, C. H. Noble, and J. T. McDermid.

South Dakota Agricultural Experiment Station
Brookings, Conservville, Eureka, Highmore, Mail, and Watertown:
D. C. Wells, G. Kingsley, G. Buchenau, L. J. Bonnesen, F. J. Holmes, E. Schearer, and A. Dittman.

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INTRODUCTION

This, the seventh annual Durum Wheat Quality Report, is for the 1968 crop. Samples of standard varieties and new strains of durum wheat grown in cooperative experiments in the durum wheat region of the United States[2/] were milled and evaluated by the Hard Red Spring and Durum Wheat Quality Laboratory in cooperation with the Department of Cereal Chemistry and Technology on the campus of North Dakota State University at Fargo, North Dakota. The evaluation of the field plot and some advanced durum wheats is integrated with the work done by the Department of Cereal Chemistry and Technology of North Dakota State University. Methods and techniques are described in detail in the text of the report.

Where sufficient quantity of sample was available, the semolina was processed into spaghetti to determine the quality characteristics. Other tests performed were dependent upon the quantity of semolina or durum wheat. When the quantity was insufficient, only the slick test and mixograph or farinograph was employed.

The purpose of this report is to make available to cooperators the quality data on standard varieties and new strains of durum wheat from the 1968 crop.

The relatively new milling and slick test adopted in this report is more fullydescribed under the Milling, the Color Score, and Dry Slick Color Score in the Methods Section. A statistical study of results, comparing the dry slick method and other established evaluation methods was given in the section of Statistical Study of the Dry Slick Color Score in the 1963 Report (CR-59-64). A new method using a Buhler experimental mill and Miag laboratory purifier was employed to process the macro samples of durum wheat.

2/ Lebsock, K. L. "Results on Spring Wheat Varieties Grown in Cooperative Plot and Nursery Experiments in the Spring Wheat Region in 1968." Crops Research Division, ARS, USDA, CR-9-69.

INTRODUCTION

This, the seventh annual Durum Wheat Quality Report, is for the 1958 crop. Samples of standard varieties and new strains of durum wheat grown in cooperative experiments in the durum wheat region of the United States[2/] were milled and evaluated by the Hard Red Spring and Durum Wheat Quality Laboratory in cooperation with the Department of Cereal Chemistry and Technology on the campus of North Dakota State University at Fargo, North Dakota. The evaluations of the field plot and some advanced durum wheats is integrated with the work done by the Department of Cereal Chemistry and Technology of North Dakota State University. Methods and techniques are described in detail in the text of the report.

Where sufficient quantity of sample was available, the semolina was processed into spaghetti to determine the quality characteristics. Other tests performed were dependent upon the quantity of semolina or durum wheat. When the quantity was insufficient, only the milk test and mixograph or farinograph was employed.

The purpose of this report is to make available to cooperators the quality data on standard varieties and new strains of durum wheat from the 1958 crop.

The relatively new milling and milk test adopted in this report is more fully described under the MILLING, the Color Score, and Dry Milk Color Score in the Methods Section. A statistical study of results, comparing the dry milk method and other established evaluation methods was given in the section of Statistical Study of the Dry Milk Color Score in the 1953 Report (GR-39-54). A new method using a Buhler experimental mill and Mills Laboratory purifier was employed to process the macro samples of durum wheat.

2/ Babcock, K. L. "Results on Spring Wheat Varieties Grown in Cooperative Plot and Nursery Experiments in the Spring Wheat Region in 1958." Crops Research Division, ARS, USDA, CR-9-59.

SOURCE OF THE SAMPLES

Three hundred and forty-two samples were received from 25 stations in six states -- Minnesota, Montana, North Dakota, Oregon, South Dakota, and Washington for durum wheat quality tests. Approximately 25% of the samples tested were the named commercial varieties of Lakota, Langdon, Leeds, Mindum, Sentry, Stewart 63, and Wells. The remaining samples were either new varieties or samples received from a special test for quality evaluation.

Sixty-seven Advanced Yield Nursery samples were received from six stations in Montana (Bozeman, Creston, Havre, Huntley, Moccasin, and Sidney); the Carrington station in North Dakota; two stations in Oregon (Moro and Pendleton); six stations in South Dakota (Brookings, Centerville, Eureka, Highmore, Wall, and Watertown), and two stations in Washington (Ellensburg and Othello).

Eleven samples were received from Field Plots grown at Carrington, and Williston, North Dakota.

One hundred and twenty-four Preliminary Nursery samples were grown at Fargo, North Dakota and Pullman, Washington.

Thirty-two Special Nursery samples were received from Pullman, Washington.

One hundred and eight samples were Uniform Regional Nursery samples grown at the Crookston, Morris, and St. Paul, Minnesota stations; Dickinson, North Dakota station; Eureka and Watertown, South Dakota stations. No samples were received from Montana.

On page 5 are listed the durum wheats which were included in the Uniform Regional Nursery 1968 trials. The variety or cross, the station which developed the variety, the state selection number, and the C.I. number are given.

UNIFORM REGIONAL DURUM NURSERY

Entry No.	Cross or Variety	C.I. or Sel. No.	Year Entered	Source
1	Mindum	5296	1929	Minnesota
2	Wells	13333	1957	U.S.D.A.-N. Dak.
3	Lakota	13335	"	"
4	Leeds	13768	1963	"
5	56-1/Ldn	63-3	1966	"
6	RL3907/RL3304//Sr/Ld393	DT191	"	Canada
7	Lk*2/Pelissier	DT316	1968	"
8	do	DT317	"	"
9	Ld393/2*Ldn/3/Ld398/ /Ld357*2/St464	D6517	"	U.S.D.A.-N. Dak.
10	61-130/Leeds	D6567	"	"
11	Leeds//Ldn/Br134	D6586	"	"
12	Leeds/62-220	D6591	"	"
13	61-130/61-48	D6599	"	"
14	61-130/61-48	D65100	"	"
15	Leeds//62-220/61-130	D65114	"	"
16	Lds/4/St//Ld379/Ld357/ 3/DWF4/Ldn	D65134	"	"
17	61-130/Leeds	D6654	"	"
18	do	D6655	"	"

METHODS

The methods used in the testing of the samples were essentially the same as given in last year's report, with the addition of some new tests and interpretations of the tests.

Briefly, the following methods and terminologies were applied:

Test Weight Per Bushel - The weight per Winchester bushel of dockage-free wheat.

Thousand Kernel Weight - The 1000 kernel weight was determined by counting the number of kernels in a 10 g. sample of cleaned, picked wheat with an Asco Seed Counter[3/].

Kernel Size - The percentage of the size of the kernels (large, medium, and small) was determined on a wheat sizer as described by Shuey[4/].

The sieves of the sizer were clothed as follows:

Top Sieve	-	Tyler # 7 with 2.92 mm. opening
Middle Sieve	-	Tyler # 9 with 2.24 mm. opening
Bottom Sieve	-	Tyler #12 with 1.65 mm. opening

Milling - Some of the large advanced yield nursery samples were milled and tested in cooperation with the Department of Cereal Chemistry and Technology, North Dakota State University. The dockage-free wheat was tempered in two stages; first to 13.5% moisture for 18 hours, then to 15-1/2% one hour before milling. The method is essentially the same as described by Harris and Sibbitt[5/].

The field plot and large advanced yield nursery samples were milled on a Buhler experimental mill specially designed for

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3/ Mention of a trademark name or a proprietary product does not constitute a guarantee or warranty of the product by the USDA, and does not imply its approval to the exclusion of other products that may also be suitable.

4/ Shuey, William C. A Wheat Sizing Technique for Predicting Flour Milling Yield. Cereal Science Today 5: 71-72,75 (1960).

5/ Harris, R. H., and Sibbitt, L. D. Experimental Durum Milling and Processing Equipment with Further Quality Studies on North Dakota Durum Wheats. Cereal Chemistry 19: 388-402 (1942).

milling durum wheat. The mill is equipped with corrugated rolls throughout and the semolina purified on a Miag laboratory purifier. All of the stock is handled pneumatically. A flow diagram for the mill is shown on Page 10. The clean dry wheat was tempered in three stages: first to 12.5% moisture at least 72 hours prior to the second stage which is to add an additional 2.0% for 18 hours to give a cumulative moisture of 14.5%, then a final temper of 3.0%, 45 minutes prior to milling.

The other samples were milled on a modified Brabender Quadrumat Jr. Mill. The #4 roll was replaced by a wooden blank plug. The drum sieve was clothed with #18 wire. The throughs of the #18 wire were sifted on a Strand sifter equipped with a #30 Tyler sieve. The sample was tempered to 12.5% and allowed to stand for at least 72 hours. After the sample was properly tempered for the required length of time to 12.5% moisture, the sample was again tempered to 13.5% and allowed to stand over night. An additional 2.5% moisture was added to the sample one-half to three-fourths hour before milling. The sample was sifted on the Tyler wire for one minute. The throughs of the #30 wire were classified as unpurified semolina. This material was used in testing the quality of the semolina.

Protein Content - The protein was calculated by multiplying by the factor of 5.7, the percent nitrogen, as determined by the standard Kjeldahl procedure.

Mineral Content or Ash Content - This was determined by measuring the residue of the minerals left after incinerating the sample for approximately 16 hours at 600°C. The results were reported as percentage of the sample which was incinerated.

Absorption - This was the water, expressed as percent of the semolina required to bring the dough to the proper consistency.

All values (protein, ash, absorption) are reported on a 14% moisture basis.

Color Score - The color of the spaghetti or semolina has been generally accepted as the most important single grading factor. A deep amber or golden color is the most preferable. The amount of yellow pigmentation determines the extent or degree of amberness.

Samples which have a color rating below 8 for spaghetti and 80 for slick color are unsatisfactory. It is possible that the average color score for a crop year may be higher or lower than average, therefore, this would be taken into consideration when giving the overall rating of a variety for that given year. A

sample may receive a low rating for reasons other than a deficiency of yellow pigmentation such as: D - Dullness; G - Grayness; R - Redness; B - Branny; W - White Cast or Chalkiness; and S - Speckiness, or a combination of these factors. The sample will be rated accordingly with the exception of the intensity, quantity, and depth of the yellow pigmentation.

The following grading system has been adopted for scoring the color of spaghetti and semolina:

COLOR SCORE

Spaghetti	Dry Slick	Description
12	105	Much deeper and intense yellow pigmentation than standard.
11	100	Deeper and more intense yellow pigmentation than standard.
10	90	Standard quality, depth and intensity of yellow pigmentation.
9	85	Slightly less depth and intensity, but sufficient quantity of pigmentation.
8	80	Slightly less quantity as well as depth and intensity of pigmentation than the standard, but still sufficient to be rated satisfactory on the basis of color.
7	70	Sufficiently less quantity of yellow pigmentation than the standard to give a pale yellow color and graded unsatisfactory for color score.
6	60	Sufficiently less quantity of yellow pigmentation than the standard to give a very pale yellow color.
5	50	Only a sufficient quantity of yellow pigmentation to indicate an off-white color with a yellow hue.

The numerical rating describes the depth or amount of pigmentation.

In cases where a sample is graded down because of off-color, speckiness, etc., the designation is shown by a letter abbreviation following the numerical score. For example: 4 W would indicate the sample was chalky white with little or no yellow pigmentation; 6 D would indicate that the sample had some yellow pigmentation, but was dull.

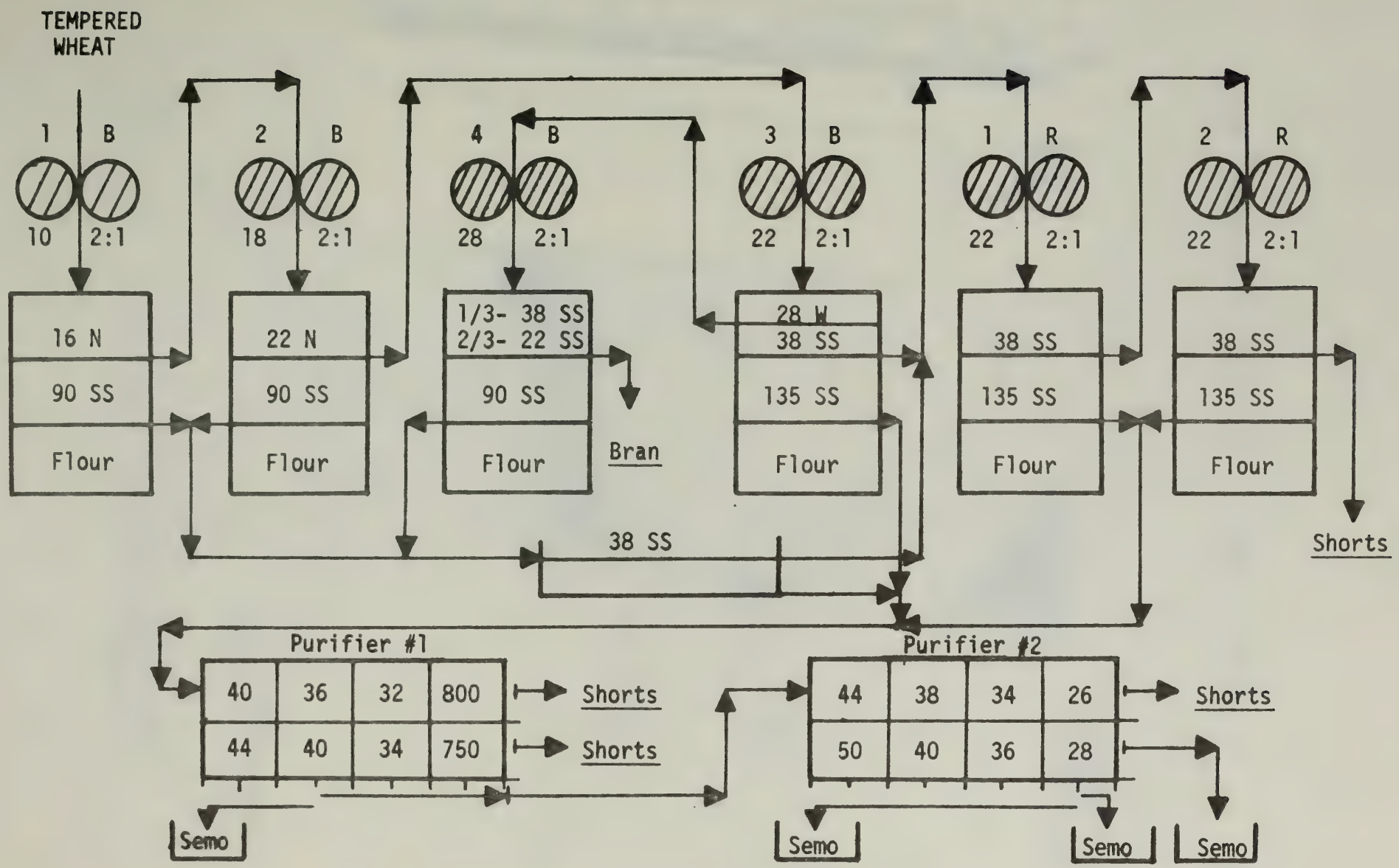
Dry Slick Color Score - This is determined by slicking the sample with a standard of known color rating and comparing the two.

Mixogram - Farinogram - The mixograph was used when the sample was too small for the farinograph. With either instrument is yielded a graphic record of the progressive changes in dough characteristics during the mixing process. A descriptive term relative to strength has been used to describe the curve rather than numerical values. The reference mixogram and farinogram patterns are shown at the end of the report.

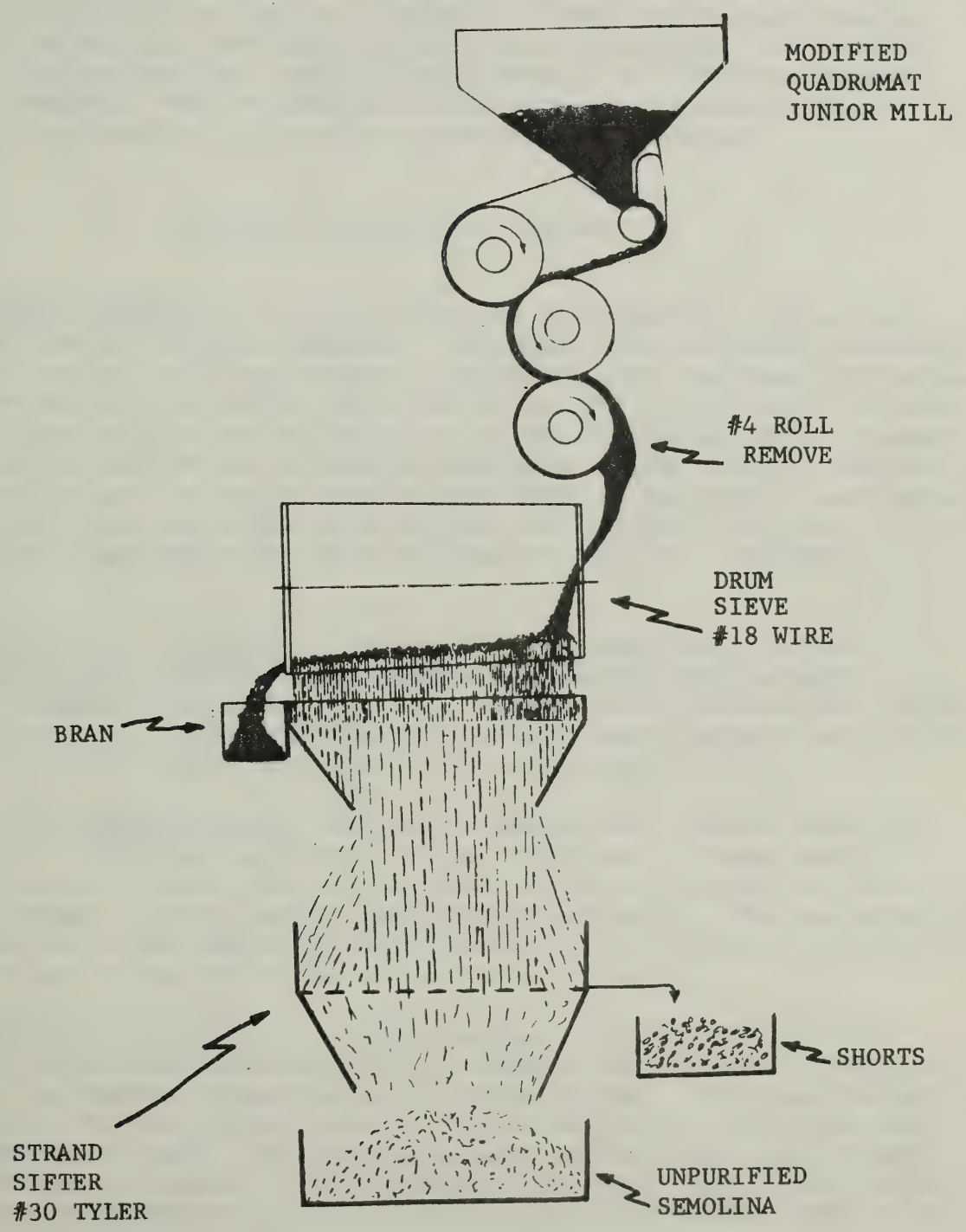
Spaghetti - Thirty grams of semolina were mixed with water to form a stiff dough, pressed into spaghetti and dried. The equipment and procedure have been described by Harris and Sibbitt[5/], Fifield[6/], Gilles, Sibbitt, and Shuey[7/], and Walsh, Gilles, and Shuey [8/].

5/ Harris and Sibbitt, loc. cit.
6/ Fifield, C. C. Experimental Equipment for Manufacture of Alimentary Pastes. Cereal Chem. 11: 330-334 (1934).
7/ Gilles, K. A., Sibbitt, L. D., and Shuey, W. C. Automatic Laboratory Dryer for Macaroni Products. Cereal Sci. Today 11: 322-324 (1966).
8/ Walsh, D. E., Gilles, K. A., and Shuey, W. C. Color Determination of Spaghetti by the Tristimulus Method. Cereal Chem. 46: 7-14 (1969).

FLOW DIAGRAM FOR LARGE DURUM WHEAT SAMPLES



FLOW DIAGRAM FOR SMALL DURUM WHEAT SAMPLES



EXPERIMENTAL RESULTS

The results obtained for the 1968 crop of durum wheat samples are tabulated and presented in the following order: Tables 1 through 6 - Advanced Yield Nursery Samples; Table 7 - Field Plot Nursery Samples; Tables 8 through 11 - Preliminary Yield Nursery Samples; Table 12 - Special Nursery Samples; and Tables 13 through 18 - Uniform Regional Nursery Samples. Very few samples tested exhibited sprout damage, although some samples did exhibit weathering and blackpoint.

ADVANCED YIELD NURSERY SAMPLES

Montana (Table 1). Fourteen advanced yield nursery samples were received from six Montana stations -- Bozeman, Creston, Havre, Huntley, Moccasin, and Sidney. The samples were comprised of two named varieties, Leeds and Wells. The samples were raised on both irrigated and dryland at the Sidney station and on irrigated at the Bozeman station. Comparison of the dryland versus irrigated samples at Sidney show the samples raised on dryland had poorer test weight, 1000 kernel weight, and kernel size distribution but higher protein than the irrigated samples. There was only a slight advantage on an average in color for the dryland samples.

North Dakota (Table 2). Ten samples were received from the Carrington, North Dakota station from the advanced yield nursery. Four of these samples were named varieties, Lakota, Leeds, Mindum, and Wells. All of the samples submitted from this nursery showed good promise when compared with the named varieties grown in the same nursery.

Oregon (Tables 3 & 4). Seventeen samples were received from two stations -- Moro and Pendleton, Oregon. Thirteen of these samples were the named varieties but not all were durums -- Federation, Idaed 59, Lakota, Langdon, Leeds, Rosner, Stewart 63, and Wells. The two selections submitted for evaluation show some promise at both locations and are only slightly poorer than the Leeds variety in color score.

South Dakota (Table 5). Twelve samples were received from the advanced yield nurseries from six locations in South Dakota -- Brookings, Centerville, Eureka, Highmore, Wall, and Watertown. These samples were comprised of the two named varieties, Leeds and Wells. The Leeds variety had higher test weight, 1000 kernel weight, larger kernel size distribution, protein content, percent semolina, and color score than the Wells samples on an average at all locations; however, it was one point lower in mixogram pattern score.

Washington (Table 6). Fourteen samples were received from two stations in Washington -- Ellensburg and Othello. Four of the samples were the named varieties, Sentry and Leeds.

Selection WA 5288 shows some promise, while selections 5289, 5290, 5291, and 5295 show good promise. Selection WA 5288 had the lowest average 1000 kernel weight, percent large kernels, and protein content, as well as the highest speck count and poorest color score, although this was acceptable. Of the series, it would be rated the poorest because of minimal acceptable quality for consideration in foreign trade. Selection WA 5289 was not as good as Leeds with a minimum semolina yield. Selection WA 5290 had acceptable quality and similar to Leeds, except for protein content and color score which were slightly down, but had a good speck count. Selection WA 5291 has most acceptable quality of the series, although the 1000 kernel weight and percent large kernels could be higher. The color is very good and similar to Leeds. Selection WA 5295 had the lowest test weight and semolina yield and highest mixogram pattern which made it different from WA 5289, but other characteristics were about equal to Selection WA 5289.

FIELD PLOT NURSERY SAMPLES

North Dakota (Table 7). Eleven field plot samples were received from two stations in North Dakota -- Carrington and Williston. Seven of these samples were the named varieties, Lakota, Leeds, Mindum, and Wells. Selection 63-3 showed good promise at Carrington and some promise at Williston because of lower test weight and lower 1000 kernel weight; however, on an average, this selection would show good promise. Selection DT 191 showed good promise at Carrington, but little promise at Williston, having lower test weight, but poorer color score than Leeds. On an average, DT 191 would show some promise but would be rated down on two main factors of test weight and color score.

PRELIMINARY YIELD NURSERY SAMPLES

North Dakota (Table 8). Nineteen durum dwarf two-row nursery samples were received from the Fargo, North Dakota nursery. Three of the samples were the named varieties, Leeds and Wells.

The eight selections which showed no promise were: 6749, 6754, 6764, 6765, 6767, 6768, 6774, and 6775.

The four selections which showed little promise were: 6753, 6780, 6781, and 6782.

The three selections which showed some promise were: 6710, 6766, and 6773.

Only one selection showed good promise, which was No. 6750.

North Dakota (Table 9). Sixty-six samples were received from the two-row preliminary nursery at Fargo, North Dakota. Eight of these samples were the named varieties, Wells, Leeds, and Langdon. Also in this series was a durum from Italy which would rank as having no promise due to very poor color score.

The six selections which showed no promise were: 676, 677, 678, 6742, 6744, and 6783.

The eight selections which showed little promise were: 672, 6715, 6716, 6718, 6720, 6726, 6745, and 6748.

The twenty-six selections which showed some promise were: 673, 679, 6711, 6712, 6713, 6718, 6719, 6721, 6722, 6725, 6727, 6732, 6733, 6734, 6735, 6736, 6737, 6738, 6739, 6740, 6741, 6743, 6751, 6758, 6759, and 6761.

The seventeen selections which showed good promise were: 671, 674, 675, 6717, 6723, 6724, 6728, 6729, 6730, 6731, 6752, 6755, 6756, 6757, 6760, 6762, and 6763.

North Dakota (Table 10). Thirteen samples were received from the Mexico single-row nursery grown at Fargo, North Dakota. Two of these were the named varieties, Leeds and Wells.

One selection showed no promise -- No. 6772.

The four selections which showed little promise were: 6746, 6747, 6776, and 6777.

The six selections which showed some promise were: 6754A, 6769, 6770, 6771, 6778, and 6779.

Washington (Table 11). Twenty-six samples were received from the Pullman, Washington station preliminary nursery. Four of these were the named varieties, Langdon and Wells.

The six entries which showed no promise were: 62, 82, 84, 89, 91, and 93.

The three entries which showed little promise were: 73, 97, and 99.

The eight entries which showed some promise were: 58, 59, 67, 68, 74, 83, 85, and 94.

The five entries which showed good promise were: 63, 65, 69, 70, and 75.

SPECIAL NURSERY SAMPLES

Washington (Table 12). Thirty-two samples were received from Pullman, Washington special nursery. Five of these samples were the named varieties, Lakota, Leeds, and Sentry -- although two were identified by the code CI013102 and CI01335, they were the varieties, Sentry and Lakota, respectively.

Three of the selections showed no promise: X 6303104-6, NDD 06692, and NDD 66154.

One selection showed little promise, which was 6400746-2.

The two selections which showed good promise were: X 6301659-4 and NDD 06699.

The other 21 selections showed some promise.

UNIFORM REGIONAL NURSERY SAMPLES

Minnesota (Tables 13, 14, & 15). Fifty-four samples were received from three stations in Minnesota -- Crookston, Morris, and St. Paul. Twelve of the samples were the named varieties, Lakota, Leeds, Mindum, and Wells. The Crookston samples looked diseased while the Morris samples contained a considerable amount of yellow-berries, and the St. Paul samples definitely showed bleaching.

North Dakota (Table 16). Eighteen samples were received from the Dickinson, North Dakota station. Four of these samples were the named varieties, Lakota, Leeds, Mindum, and Wells.

South Dakota (Tables 17 & 18). Thirty-six samples were received from two stations in South Dakota -- Eureka and Watertown. Eight of these samples were the named varieties, Lakota, Leeds, Mindum, and Wells.

The overall general evaluations for the varieties from the three states is indicated below:

Selection 63-3 has good promise. Two previous years testing on this selection showed this selection to have some promise.

Selection 6517 averages some promise, although at St. Paul and Watertown it showed little promise.

Selection 6567 shows no promise as a new variety, based primarily on the very poor color.

Selection 6586 shows some promise with minimum color.

Selection 6591 shows some promise and better color than either 6586 or 6517.

Selection 6599 shows no promise primarily because of erratic results and poor color.

Selection 65100 shows good promise.

Selection 65114 shows some promise having good color but low 1000 kernel weight and percentage of large kernels.

Selection 65134 shows some promise, although giving erratic results with poor color at Crookston, the other stations would average as showing good promise.

Selection 6654 shows no promise giving erratic results and minimum color.

Selection 6655 shows no promise, having minimum test weight and poor color score.

Selection DT 191 shows little promise, giving erratic results and minimum color score. Previous years testing has shown this selection to show some promise, although it has given minimum color.

Selection DT 316 shows some promise but has minimum test weight and kernel size distribution.

Selection DT 317 shows good promise, although the selection does have minimum test weight.

TABLE 1

QUALITY DATA ON MONTANA ADVANCED YIELD DURUM WHEAT NURSERY SAMPLES

Irrigated and Dryland

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Sem. Pro. 2/	Pur. Sem. 3/	Ash 2/	Specks/ 10 Sq.In.	Sem. Abs. 2/	Vis. Color 4/
		#/Bu.	g.	%	%	%	%	%	%	%		%	
Bozeman, Montana (Irrigated)													
Leeds	13768	62.0	35.7	43	55	2	15.4	14.6	58.8	.75	23	33.7	9.0
Wells	13333	59.1	25.6	8	81	11	15.7	14.8	56.5	.77	20	34.3	9.0
Creston, Montana (Dryland)													
Leeds	13768	62.1	39.7	58	41	1	15.1	14.1	60.5	.63	37	33.7	9.5
Wells	13333	61.2	32.3	37	59	4	14.3	13.4	59.0	.61	33	34.0	8.5
Havre, Montana (Dryland)													
Leeds	13768	56.3	28.0	2	93	5	19.0	18.2	55.6	.86	17	33.7	8.0
Wells	13333	54.6	19.8	1	62	37	19.0	18.1	50.7	.82	20	34.3	8.5
Huntley, Montana (Dryland)													
Leeds	13768	62.2	38.0	53	44	3	12.5	11.7	60.7	.70	23	33.0	9.5
Wells	13333	62.0	32.9	34	61	5	11.8	10.8	55.8	.64	23	33.3	9.0
Moccasin, Montana (Dryland)													
Leeds	13768	62.7	30.6	4	94	2	14.5	14.1	60.5	.76	17	33.7	9.5
Wells	13333	62.5	26.7	2	89	9	13.3	12.8	59.4	.72	17	34.3	9.5
Sidney, Montana (Dryland)													
Leeds	13768	60.2	33.8	15	83	2	18.1	17.2	59.7	.78	20	33.3	9.0
Wells	13333	59.1	27.2	6	86	8	18.3	17.5	57.8	.75	27	34.7	8.5
Sidney, Montana (Irrigated)													
Leeds	13768	63.6	41.0	60	38	2	13.0	12.1	62.6	.72	33	35.0	8.5
Wells	13333	62.7	37.5	49	48	3	11.8	10.8	60.1	.65	33	33.7	8.5

1/ Unofficial
2/ 14% Moisture Basis
3/ Purified
4/ Below 8 color score not acceptable.

Table 2

QUALITY DATA ON ADVANCED YIELD DURUM WHEAT NURSERY SAMPLES

Carrington, North Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	61.0	31.1	23	71	6	12.9	43.3	82	6	
Leeds	13768	64.0	35.2	29	69	2	14.5	44.4	88	4	
Mindum	5296	62.5	33.7	24	69	7	11.4	44.6	79	6	
Wells	13333	63.0	29.8	25	69	6	13.3	43.6	80	4	
63-3		62.5	36.5	34	61	5	12.9	43.9	87	6	4
5680		63.0	38.9	52	46	2	13.3	47.3	85	5	4
6567		64.5	40.8	50	49	1	13.5	44.5	85	6	4
65100		63.5	37.6	46	53	1	14.1	46.1	95	5	4
65114		64.0	34.8	25	73	2	13.0	46.1	95	3	4
DT 191		63.5	41.2	50	48	2	12.8	45.5	89	6	4

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 3

QUALITY DATA ON ADVANCED YIELD DURUM WHEAT NURSERY SAMPLES

Moro, Oregon

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	56.5	23.6	1	77	22	12.1	34.7	100	5	
Langdon	13165	58.5	29.0	2	82	16	11.7	40.8	87	3	
Leeds	13768	60.5	29.0	4	86	10	12.3	38.8	104	3	
Rosner		47.0	23.0	1	84	15	13.9	28.6	55	4	
Stewart 63	13771	56.5	23.7	1	67	32	12.8	37.3	88	5	
Wells	13333	58.0	24.0	2	78	20	11.8	37.6	91	3	
Langdon x 56-1, 63-1		58.5	30.0	5	84	11	11.1	40.5	93	6	3
56-1 x LD 408, 63-51		59.0	26.8	2	80	18	11.6	39.0	101	6	3

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 4

QUALITY DATA ON ADVANCED YIELD DURUM WHEAT NURSERY SAMPLES

Pendleton, Oregon

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Federation	4734	55.0	22.5	2	88	10	12.7	43.6	65	5	
Idaed 59	13631	57.0	26.5	14	81	5	14.6	44.3	60	5	
Lakota	13335	55.5	24.9	2	85	13	16.0	36.7	100	5	
Langdon	13165	58.0	28.2	2	88	10	15.4	39.5	96	3	
Leeds	13768	60.0	30.4	4	91	5	15.6	39.1	102	3	
Stewart 63	13771	54.5	24.8	1	70	29	16.6	34.2	86 R	7	
Wells	13333	56.0	23.8	1	85	14	16.1	36.5	100	4	
Langdon x 56-1, 63-1		57.0	30.9	3	90	7	15.5	37.3	100	5	3
56-1 x LD 408, 63-51		58.0	27.6	2	87	11	15.2	38.2	102	4	3

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. R - Red.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 5

QUALITY DATA ON SOUTH DAKOTA ADVANCED YIELD DURUM WHEAT NURSERY SAMPLES

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/
		#/Bu.	g.	%	%	%	%	%		
Brookings, South Dakota										
Leeds	13768	62.0	37.5	36	62	2	16.9	42.7	100	3
Wells	13333	61.5	32.8	16	80	4	16.6	41.1	95 S	4
Centerville, South Dakota										
Leeds	13768	62.0	38.5	51	48	1	16.8	38.8	90 S	3
Wells	13333	63.0	34.2	43	54	3	16.3	40.2	85	4
Eureka, South Dakota										
Leeds	13768	66.0	37.7	43	56	4	14.6	41.1	91	3
Wells	13333	64.0	32.4	9	85	6	13.8	40.0	87	4
Highmore, South Dakota										
Leeds	13768	63.0	33.7	9	87	4	16.2	41.8	95	4
Wells	13333	61.0	26.5	1	89	10	15.5	38.4	87	4
Wall, South Dakota										
Leeds	13768	59.5	25.5	1	84	15	19.7	38.6	98	3
Wells	13333	54.0	19.2	0	65	35	20.2	31.1	88	5
Watertown, South Dakota										
Leeds	13768	63.0	34.4	12	85	3	17.9	41.6	91	3
Wells	13333	61.5	27.5	6	86	8	16.6	39.3	86	4

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. S - Specky.
5/ Refer to Reference Mixograms for numerical curve pattern.

TABLE 6

QUALITY DATA ON WASHINGTON ADVANCED DURUM YIELD NURSERY PLOTS

1968 CROP

Variety or Sel. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Pur. Semo. Yld.	Semo. Min. 2/	Semo. Pro. 2/	Semo. Specks/ 10 Sq.In.	Semo. Abs. 2/	Mix. Pat. 3/	Mac. Color	Gen. Eval. 4/
	#/Bu.	g.	%	%	%	%	%	%	%		%			
Ellensburg														
Sentry	64.0	41.3	52	47	1	11.8	44.1	.55	10.5	20	33.7	3	9.0	
Leeds	64.0	38.9	49	50	1	11.7	45.1	.59	10.7	17	33.7	3	9.5	
WA 5288	63.5	35.7	21	75	4	10.3	46.4	.60	8.9	37	35.0	6	8.5	3
WA 5289	64.5	38.8	41	58	1	11.9	44.9	.53	10.4	23	34.3	4 a/	9.0	4
WA 5290	64.5	40.2	42	57	1	12.0	46.8	.53	10.4	17	34.0	5	9.0	4
WA 5291	64.5	37.7	30	68	2	11.7	44.9	.53	10.3	17	34.7	4	9.5	4
WA 5295	63.0	38.5	42	54	4	11.7	44.2	.59	10.1	27	35.3	6 b/	9.0	4
Othello														
Sentry	64.0	45.0	64	35	1	14.1	42.9	.58	12.3	20	33.0	3	8.5	
Leeds	64.5	42.4	60	39	1	13.5	47.3	.62	11.9	27	32.7	2	9.5	
WA 5288	64.0	35.5	19	77	4	11.1	45.3	.58	9.8	33	33.3	5	9.0	3
WA 5289	64.5	38.8	44	55	1	12.2	43.7	.59	11.1	17	33.7	4 a/	9.0	4
WA 5290	64.0	40.7	53	45	2	12.1	44.0	.56	10.7	13	33.7	3	9.0	4
WA 5291	64.5	39.7	41	58	1	12.1	48.3	.54	10.7	17	33.7	3	9.5	4
WA 5295	63.0	41.5	59	39	2	12.3	40.2	.59	10.7	23	34.0	6 b/	9.0	4
Average														
Sentry	64.00	43.15	58.0	41.0	1.0	12.95	43.50	.565	11.40	20.0	33.35	3.0	8.75	
Leeds	64.25	40.65	54.5	44.5	1.0	12.60	46.20	.605	11.30	22.0	33.20	2.5	9.50	
WA 5288	63.75	35.60	20.0	76.0	4.0	10.70	45.85	.590	9.35	35.0	34.15	5.5	8.75	3
WA 5289	64.50	38.80	42.5	56.5	1.0	12.05	44.30	.560	10.75	20.0	34.00	4.0	9.00	4
WA 5290	64.25	40.45	47.5	51.0	1.5	12.05	45.40	.545	10.55	15.0	33.85	4.0	9.00	4
WA 5291	64.50	38.70	35.5	63.0	1.5	11.90	46.60	.535	10.50	17.0	34.20	3.5	9.50	4
WA 5295	63.00	40.00	50.5	46.5	3.0	12.00	42.20	.590	10.40	25.0	34.65	6.0	9.00	4

1/ Unofficial
2/ 14% moisture basis
3/ Refer to Reference Mixograms for numerical curve pattern.
4/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

a/ 50-50 blend of WA 5289 from Ellensburg and Othello.
b/ 50-50 blend of WA 5295 from Ellensburg and Othello.

TABLE 7

QUALITY DATA ON NORTH DAKOTA DURUM FIELD PLOT NURSERY SAMPLES

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Sem. Pro. 2/	Pur. Sem. 3/	Ash 2/	Specks/ 10 Sq.In.	Sem. Abs. 2/	Vis. Color 4/	Gen. Eval. 5/
		#/Bu.	g.	%	%	%	%	%	%	%		%		
Carrington, North Dakota														
Lakota	13335	58.9	34.0	42	55	3	13.0	12.1	58.1	.64	43	34.3	8.5	
Leeds	13768	62.0	35.3	41	57	2	14.0	13.3	61.2	.70	43	33.0	9.0	
Mindum	5296	59.9	31.9	33	62	5	12.0	11.4	57.5	.63	50	34.3	8.5	
Wells	13333	61.4	32.2	37	60	3	13.5	12.7	59.0	.69	50	34.0	8.5	
63-3		61.9	36.9	56	41	3	12.9	12.2	62.1	.60	53	34.3	8.5	4
DT 191		60.7	38.6	55	43	2	13.3	12.2	61.0	.68	47	35.0	8.5	4
Williston, North Dakota														
Leeds	13768	60.7	33.0	3	94	3	18.3	17.5	58.4	.75	37	32.3	9.5	
Mindum	5296	59.4	46.7	10	84	6	17.5	16.9	58.0	.65	27	34.3	8.0	
Wells	13333	59.3	26.7	5	85	10	18.2	17.4	56.0	.69	33	33.7	8.0	
63-3		58.9	29.2	6	85	9	17.8	16.9	58.4	.72	30	35.0	9.5	3
DT 191		58.8	33.4	10	88	2	17.6	16.8	58.1	.67	30	35.0	8.0	2

1/ Unofficial
2/ 14% Moisture Basis
3/ Purified
4/ Below 8 color score not acceptable.
5/ 1- No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 8

QUALITY DATA ON PRELIMINARY DURUM DWARF 2-ROW NURSERY SAMPLES

Fargo, North Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
D 6710		65.0	38.3	24	75	1	12.2	43.5	93	3	3
Wells	13333	64.0	33.7	11	85	4	13.1	43.1	91	2	
D 6749		63.0	39.8	31	67	2	13.4	42.3	80	3	1
D 6750		63.0	36.2	25	73	2	14.2	43.8	105	2	4
D 6753		62.0	35.3	7	89	4	12.5	44.2	91	2	2
Leeds	13768	65.0	38.9	29	69	2	13.8	43.2	87	2	
D 6754		61.0	34.0	12	85	3	13.4	41.3	70	5	1
D 6764		63.0	34.5	22	75	3	13.0	40.1	75 R	5	1
D 6765		63.0	38.5	43	56	1	13.7	43.8	81	4	1
D 6766		63.0	35.5	13	83	4	13.5	43.8	85	3	3
D 6767		64.0	32.4	13	84	3	13.3	44.2	65 W	3	1
D 6768		63.0	31.2	8	87	5	13.3	41.9	79	4	1
D 6773		62.0	31.5	14	82	4	13.1	42.3	94	4	3
D 6774		62.5	34.6	18	79	3	13.2	42.6	75	2	1
D 6775		62.5	34.1	23	75	2	12.0	41.9	78	2	1
D 6780		63.0	37.9	15	83	2	12.1	41.6	85	3	2
D 6781		63.0	38.8	26	72	2	12.4	42.3	82	3	2
S 6782		62.5	38.2	17	82	1	12.3	41.6	84	5	2
Leeds	13768	65.0	38.0	20	78	2	13.7	43.4	96	2	

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. R - Red, W - White.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 9

QUALITY DATA ON DURUM 2-ROW PRELIMINARY YIELD NURSERY SAMPLES

Fargo, North Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
D 671		63.0	51.8	70	30	0	13.3	42.3	87	3	4
D 672		62.5	35.7	16	81	3	13.9	41.9	87	5	2
D 673		64.5	40.3	37	62	1	13.2	43.4	87	4	3
D 674		65.5	40.2	45	53	2	13.7	43.1	87	4	4
D 675		65.5	38.9	42	57	1	14.1	47.4	85	3	4
Wells	13333	65.0	35.8	18	79	3	12.4	43.1	85	3	
D 676		63.5	37.6	19	79	2	12.9	44.5	70	5	1
D 677		62.5	37.0	20	79	1	13.6	44.9	80	4	1
Leeds	13768	65.0	37.3	30	68	2	14.1	45.3	88	2	
D 678		65.0	40.5	42	57	1	12.5	44.5	65	5	1
D 679		63.0	39.8	38	62	0	13.3	43.1	91	3	3
D 6711		64.5	40.2	26	73	1	13.7	43.8	95	3	3
D 6712		65.0	38.8	35	65	0	13.2	44.2	90	2	3
D 6713		64.5	38.6	28	71	1	13.8	42.3	92	4	3
D 6714		64.0	39.8	36	63	1	12.4	44.5	90	4	3
Langdon	13165	65.0	36.9	32	66	2	12.4	45.3	81	3	
D 6715		64.5	40.0	34	64	2	12.8	43.8	84	3	2
D 6716		64.5	35.6	22	75	3	12.8	43.5	93	2	2
D 6717		63.5	39.2	45	54	1	13.4	44.9	91	2	4
D 6718		65.0	43.3	42	57	1	13.5	43.4	83	4	2
D 6719		65.0	42.0	45	55	0	13.8	43.1	85	2	3
D 6720		62.5	35.6	14	84	2	13.9	41.9	94	3	2
D 6721		64.5	40.8	37	61	2	13.3	45.3	88	3	3
D 6722		63.5	37.6	33	65	2	13.7	42.3	92	3	3
D 6723		65.0	40.8	55	45	0	13.6	44.5	91	3	4

(CONT'D.)

TABLE 9 (Cont'd.)

QUALITY DATA ON DURUM 2-ROW PRELIMINARY YIELD NURSERY SAMPLES

Fargo, North Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
D 6724		64.0	40.3	62	38	0	14.4	44.5	90	4	4
D 6725		65.0	36.1	23	77	0	13.6	44.9	95	4	3
D 6783		60.0	34.6	11	87	2	14.4	43.1	82	5	1
D 6726		62.0	34.5	11	88	1	14.1	41.3	86	5	2
D 6727		64.5	38.9	35	64	1	14.4	43.4	94	4	3
D 6728		64.5	40.0	47	52	1	14.1	43.4	92	4	4
D 6729		64.0	36.5	14	84	2	13.6	44.1	92	2	4
D 6730		64.0	38.0	24	75	1	13.9	42.3	99	3	4
D 6731		63.0	40.2	41	59	0	14.0	43.4	95	2	4
D 6732		65.0	37.7	23	77	0	13.4	43.8	92	3	3
D 6733		65.0	39.4	41	59	0	14.1	44.8	89	3	3
D 6734		65.0	36.1	11	87	2	13.2	43.5	95	2	3
D 6735		63.0	37.0	17	82	1	14.2	43.8	94	4	3
D 6740		65.5	38.2	21	78	1	13.7	43.8	92	3	3
D 6741		65.0	38.0	25	74	1	13.8	44.1	93	2	3
D 6736		65.0	41.3	31	69	0	13.5	44.1	85	3	3
D 6737		65.0	38.9	39	60	1	13.4	45.3	88	3	3
D 6738		64.5	38.6	35	64	1	14.0	44.1	87	2	3
D 6739		65.5	40.5	41	58	1	13.7	44.2	88	3	3
Leeds	13768	65.0	39.7	29	71	0	13.4	42.6	91	2	
D 6742		64.0	36.1	17	80	3	12.6	40.9	78	4	1
D 6743		64.5	38.2	23	77	0	13.4	43.4	86	2	3
D 6744		64.5	42.9	61	39	0	14.3	39.7	70 R	8	1
D 6745		59.5	30.9	3	91	6	12.6	43.2	90	4	2
Langdon	13165	65.0	37.9	20	78	2	12.9	46.4	92	3	

(CONT'D.)

TABLE 9 (Cont'd.)

QUALITY DATA ON DURUM 2-ROW PRELIMINARY YIELD NURSERY SAMPLES

Fargo, North Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
D 6748		62.0	34.0	13	84	3	12.2	43.5	91	3	2
D 6751		62.0	38.2	43	55	2	12.9	42.3	89	4	3
Wells	13333	65.0	34.2	26	71	3	13.0	43.1	87	3	
D 6752		62.5	46.7	69	31	0	13.9	40.9	90	3	4
D 6755		65.0	42.7	47	51	2	14.6	45.2	95	3	4
D 6756		65.0	38.0	26	73	1	14.0	44.1	93	2	4
D 6757		65.0	41.7	53	47	0	13.8	44.9	94	5	4
D 6758		65.0	35.8	15	83	2	13.5	43.5	92	4	3
D 6759		65.5	38.5	15	83	2	12.8	46.7	86	3	3
D 6760		65.5	41.2	46	53	1	12.5	44.1	91	3	4
D 6761		65.0	38.0	47	53	0	12.5	45.0	90	3	3
D 6762		64.0	41.2	58	42	0	13.3	44.5	93	4	4
D 6763		65.0	44.8	61	38	1	13.0	43.1	87	4	4
Wells	13333	65.0	34.7	19	79	2	12.5	42.8	86	2	
Italy Durum		61.5	40.7	54	45	1	13.2	39.4	70 R	7	1
Wells	13333	65.0	36.5	27	71	2	12.9	42.3	92	3	

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. R - Red.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 10

QUALITY DATA ON MEXICO SINGLE-ROW NURSERY SAMPLES

Fargo, North Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Leeds	13768	65.0	38.5	26	73	1	14.3	40.6	100	2	
Wells	13333	65.0	33.1	25	71	4	13.9	39.9	95	3	
D 6746		60.0	29.8	7	87	6	13.3	38.4	94	3	2
D 6747		61.5	33.2	5	87	8	13.1	39.4	96	3	2
D 6754A		62.5	31.5	11	84	5	14.2	40.9	97	5	3
D 6769		63.0	33.8	8	89	3	14.2	40.6	102	4	3
D 6770		63.0	36.5	24	73	3	13.8	40.6	91	4	3
D 6771		62.5	36.9	29	69	2	13.3	40.6	90	4	3
D 6772		63.0	33.3	11	85	4	13.3	38.4	78 R	2	1
D 6776		62.0	32.6	9	86	5	13.1	40.9	96	5	2
D 6777		63.0	32.8	9	88	3	12.0	41.0	94	5	2
D 6778		60.5	35.3	23	75	2	13.9	41.6	96	5	3
D 6779		62.0	37.0	42	57	1	14.7	39.1	93	5	3

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. R - Red.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 11

QUALITY DATA ON PRELIMINARY YIELD DURUM WHEAT NURSERY SAMPLES

Pullman, Washington

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Langdon #86	13165	61.5	45.8	63	36	1	14.4	44.4	80	3	
Langdon #88	13165	60.5	35.3	27	71	2	13.9	43.0	81	5	
Wells #66	13333	61.5	35.1	38	60	2	13.9	43.0	87	3	
Wells #96	13333	61.5	35.3	37	61	2	15.1	41.5	86	4	
58		61.0	45.7	60	40	0	14.2	42.6	81	4	3
59		61.0	42.7	42	57	1	13.9	43.7	87	3	3
62		60.5	42.0	69	30	1	15.3	42.6	78	3	1
63		61.5	39.7	47	52	1	14.3	43.0	97	6	4
65		61.0	38.2	43	56	1	13.9	43.0	94	3	4
67		59.5	36.6	35	63	2	14.1	40.7	86	4	3
68		60.0	36.9	40	58	2	14.0	41.2	87	6	3
69		61.5	40.5	56	43	1	13.9	47.0	85	5	4
70		60.5	43.9	66	33	1	13.8	46.7	87	3	4
73		61.0	45.2	56	43	1	11.4	47.4	80	3	2
74		61.0	42.6	53	46	1	12.6	47.1	82	4	3
75		61.0	48.0	82	18	0	14.4	42.6	90	7	4
82		61.0	46.1	66	34	0	13.5	45.6	75	3	1
83		61.5	45.7	75	25	0	13.2	45.9	81	3	3
84		60.0	41.0	56	43	1	14.4	45.2	79	4	1
85		60.0	39.1	53	47	0	14.0	45.6	83	5	3
89		61.0	37.5	33	67	0	14.3	44.9	78	7	1
91		61.0	35.0	23	74	3	14.2	44.4	75	3	1
93		61.0	35.3	24	73	3	13.5	44.4	79	3	1
94		60.0	41.0	50	49	1	14.1	43.7	82	4	3
97		56.0	36.8	27	71	2	13.3	44.4	85	4	2
99		60.0	41.3	39	60	1	13.8	43.0	80	3	2

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 12

QUALITY DATA ON SPECIAL DURUM WHEAT NURSERY SAMPLES

Pullman, Washington

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	60.0	35.6	17	77	6	13.4	38.0	90	7	
Leeds	13768	63.5	42.2	40	57	3	14.5	40.2	93	3	
Sentry	13102	63.0	44.4	50	48	2	14.1	39.4	87	4	
6400756-2 #31		62.0	34.1	8	88	4	12.1	42.5	89	6	3
6400746-2		62.5	40.7	22	76	2	12.5	43.3	81 R	5	2
6400756-2 #48		61.5	34.2	9	86	5	12.2	42.1	90	6	3
WA 005291		63.0	34.2	8	88	4	13.4	40.9	95	5	3
X 6301234-3		63.5	34.7	6	91	3	13.5	41.7	95	5	3
X 6303104-6		62.5	35.0	8	89	3	14.1	40.2	80	5	1
X 6301659-4		63.0	39.5	21	76	3	14.7	38.6	93	5	4
CI 013102		61.0	39.5	33	64	3	14.3	42.6	87	3	3
CI 013335		58.5	33.6	18	75	7	14.5	39.5	96	5	3
D 6300001		59.5	32.7	5	87	8	12.8	44.2	88	6	3
M 6300012		61.0	36.5	23	75	2	14.0	44.2	87	3	3
M 6300018		61.5	36.1	24	73	3	14.5	42.6	95	3	3
M 6300030		60.0	34.6	16	81	3	14.9	43.3	89	5	3
M 6300035		61.5	33.7	15	83	2	14.3	44.2	91	5	3
M 6300038		61.0	37.0	23	74	3	14.7	43.1	93	3	3
NDD 06591		61.5	39.2	30	69	1	14.2	42.8	92	6	3
NDD 06654		61.0	43.7	59	40	1	13.5	45.1	86	5	3

(CONT'D.)

TABLE 13

QUALITY DATA ON UNIFORM REGIONAL DURUM WHEAT NURSERY SAMPLES

Crookston, Minnesota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	58.0	30.9	13	79	8	12.2	44.1	80 S	3	
Leeds	13768	61.5	34.6	19	77	4	13.2	43.5	85 S	3	
Mindum	5296	61.0	34.1	19	77	4	11.3	46.4	78 S	3	
Wells	13333	59.5	29.6	8	85	7	12.7	42.3	80 S	3	
63-3		58.5	32.8	21	73	6	13.2	42.0	82 S	5	4
6517		62.0	38.0	34	63	3	13.6	43.8	80 S	3	3
6567		61.0	38.2	40	57	3	11.9	44.2	70 S	3	1
6586		60.0	33.4	23	73	4	12.4	41.7	82 S	5	3
6591		61.0	40.2	42	56	2	14.1	43.1	83 S	4	3
6599		60.0	38.9	44	51	5	13.8	43.1	76 S	3	1
65100		61.5	39.4	49	48	3	13.4	43.1	86 S	4	4
65114		62.0	33.7	13	83	4	12.0	45.3	88 S	3	4
65134		61.5	34.7	39	58	3	11.5	44.5	79 S	3	2
6654		59.0	39.5	49	49	2	12.9	42.8	75 S	3	1
6655		61.0	42.7	57	41	2	12.0	44.2	70 S	3	1
DT 191		61.0	41.8	57	41	2	12.6	44.9	78 S	5	2
DT 316		59.0	37.5	35	62	3	13.0	41.3	85 S	4	4
DT 317		59.0	37.5	47	50	3	12.3	42.8	88	4	4

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. S - Specky.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 14

QUALITY DATA ON UNIFORM REGIONAL DURUM WHEAT NURSERY SAMPLES

Morris, Minnesota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	61.0	29.9	7	89	4	10.0	42.6	81	3	
Leeds	13768	65.0	38.6	35	65	0	11.4	44.9	93	2	
Mindum	5296	64.5	35.2	19	79	2	10.9	45.7	75	3	
Wells	13333	63.0	30.2	9	87	4	10.5	43.1	85	3	
63-3		64.0	40.0	42	57	1	10.7	44.9	92	3	4
6517		64.0	39.5	39	61	0	11.8	45.7	91	3	4
6567		64.0	39.5	20	79	1	10.6	45.3	80	3	2
6586		64.5	38.0	19	79	2	10.6	43.8	91	3	3
6591		64.0	39.8	25	74	1	10.6	44.1	85	3	3
6599		62.0	39.5	33	65	2	11.5	43.6	88	4	3
65100		63.0	38.2	26	73	1	11.5	42.8	93	3	4
65114		65.0	36.2	16	83	1	11.0	44.9	103	3	4
65134		64.5	38.3	29	70	1	10.4	45.7	95	3	4
6654		62.5	39.1	25	75	0	10.9	44.5	85	3	3
6655		62.5	41.2	49	50	1	10.5	46.7	75	3	1
DT 191		62.5	40.5	36	64	0	10.9	44.6	87	7	3
DT 316		62.5	37.9	25	73	2	10.6	41.3	95	5	4
DT 317		62.0	41.2	53	47	0	10.6	44.5	100	3	4

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 15

QUALITY DATA ON UNIFORM REGIONAL DURUM WHEAT NURSERY SAMPLES

St. Paul, Minnesota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	55.0	26.2	14	78	8	15.4	34.8	95 VS	5	
Leeds	13768	59.0	29.8	21	77	2	16.4	40.0	97 VS	4	
Mindum	5296	56.5	31.5	25	69	6	14.8	37.7	75 VS	5	
Wells	13333	57.0	25.7	10	80	10	15.6	33.6	94 VS	4	
63-3		57.0	31.2	30	66	4	15.2	37.4	95 VS	5	4
6517		55.0	29.1	20	75	5	16.6	34.8	83 VS	4	2
6567		56.0	30.0	11	83	6	14.8	36.8	92 VS	5	3
6586		56.0	31.1	34	62	4	15.3	36.5	90 VS	5	3
6591		57.0	31.4	24	72	4	15.4	38.2	92 VS	4	3
6599		56.0	31.8	20	75	5	16.8	37.2	77 VS	6	1
65100		59.0	33.8	35	63	2	16.1	39.0	88 VS	5	3
65114		59.0	29.1	17	79	4	15.6	37.7	86 VS	4	3
65134		58.5	29.2	24	72	4	16.2	37.0	86 VS	4	3
6654		55.0	29.2	21	70	9	15.2	37.2	80 VS	4	1
6655		54.5	30.0	23	70	7	14.8	37.0	83 VS	4	1
DT 191		56.0	31.9	30	67	3	14.7	38.8	82 VS	6	1
DT 316		54.0	36.9	14	79	7	16.5	33.6	89 VS	6	3
DT 317		52.0	28.2	33	63	4	17.1	32.8	90 VS	5	3

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. S - Specky, V - Very.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 16

QUALITY DATA ON UNIFORM REGIONAL DURUM WHEAT NURSERY SAMPLES

Dickinson, North Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	61.5	36.8	33	64	3	15.1	43.4	87	5	
Leeds	13768	63.0	42.4	25	75	0	16.2	41.3	93	3	
Mindum	5296	63.0	44.4	63	37	0	15.6	44.7	79	5	
Wells	13333	62.5	38.8	45	54	1	15.5	39.9	81	5	
63-3		62.5	45.8	76	24	0	14.9	42.5	84	6	3
6517		63.0	45.8	71	29	0	16.4	44.4	82	3	3
6567		63.5	43.5	57	43	0	14.6	41.8	80	5	2
6586		63.0	42.9	61	39	0	15.6	41.6	85	6	4
6591		63.0	42.9	48	52	0	15.5	44.0	91	5	4
6599		62.5	45.7	100	0	0	15.8	43.0	83	5	4
65100		63.0	45.5	100	0	0	17.8	42.8	90	4	4
65114		62.5	39.5	51	49	0	14.5	41.5	88	4	3
65134		63.5	42.4	62	38	0	16.4	42.8	88	3	4
6654		62.5	45.7	58	41	1	14.4	44.0	78	5	1
6655		62.0	45.8	64	36	0	14.2	42.7	80	6	2
DT 191		62.5	46.3	69	31	0	16.5	43.5	78	6	1
DT 316		61.5	44.2	44	56	0	15.7	42.7	87	7	3
DT 317		61.0	46.1	70	30	0	15.6	43.8	99	5	4

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 17

QUALITY DATA ON UNIFORM REGIONAL DURUM WHEAT NURSERY SAMPLES

Eureka, South Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	61.0	34.2	23	74	3	13.1	39.4	90	5	
Leeds	13768	64.0	38.6	38	61	1	13.9	40.0	91	3	
Mindum	5296	59.5	27.7	3	83	14	11.8	39.1	90	4	
Wells	13333	63.0	32.3	13	83	4	13.4	39.9	89	4	
63-3		63.0	39.4	48	50	2	13.9	39.9	92 S	4	4
6517		63.0	39.4	36	61	3	14.2	43.1	88	4	3
6567		63.0	41.3	45	53	2	13.9	40.6	78	5	1
6586		64.0	38.6	29	69	2	14.0	39.6	80	5	2
6591		63.5	38.3	19	79	2	14.0	39.9	85	5	3
6599		63.0	40.7	54	45	1	13.8	40.9	79	4	1
65100		63.0	38.3	41	57	2	13.9	40.1	86	4	3
65114		64.0	35.6	17	79	4	14.1	42.8	96	3	4
65134		63.0	35.8	27	72	1	14.7	41.3	95	3	4
6654		62.0	36.2	17	80	3	13.7	39.9	93	4	4
6655		61.5	37.7	21	76	3	13.5	38.7	90	4	3
DT 191		62.0	39.2	44	55	1	13.9	39.4	81	6	1
DT 316		62.0	38.2	30	69	1	13.7	37.2	93	6	4
DT 317		61.0	39.2	45	53	2	13.8	38.4	99	6	4

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. S - Specky.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

TABLE 18

QUALITY DATA ON UNIFORM REGIONAL DURUM WHEAT NURSERY SAMPLES

Watertown, South Dakota

1968 CROP

Variety or State Sel. No.	C.I. No.	T.W. 1/	1000 Kwt.	Kernel Size Lg.	Kernel Size Med.	Kernel Size Sm.	Wht. Pro. 2/	Semolina 3/	Color Score 4/	Mixogram 5/	Gen. Eval. 6/
		#/Bu.	g.	%	%	%	%	%			
Lakota	13335	57.5	28.6	5	88	7	16.8	37.0	95	5	
Leeds	13768	62.0	36.9	24	74	2	16.7	38.1	92 S	3	
Mindum	5296	58.0	28.0	3	85	12	17.3	38.4	75	5	
Wells	13333	61.0	29.3	6	89	5	16.9	38.2	90	4	
63-3		61.0	36.4	27	71	2	16.6	39.4	89	5	3
6517		62.0	39.2	25	74	1	16.5	42.3	83	3	2
6567		62.0	26.7	12	87	1	16.3	39.9	85	5	2
6586		61.0	33.7	10	87	3	15.1	39.1	86	4	3
6591		62.0	34.0	13	85	2	16.8	38.7	90 S	4	3
6599		60.0	37.6	23	75	2	16.5	41.2	91 S	5	3
65100		61.0	37.0	22	76	2	16.8	39.4	92	5	4
65114		61.5	32.9	9	89	2	17.1	37.5	91 S	4	3
65134		58.5	32.4	9	89	2	17.2	44.9	89	4	3
6654		59.0	36.2	11	85	4	15.6	42.0	79 VS	4	1
6655		59.0	33.8	7	88	5	15.9	41.6	80 S	5	1
DT 191		60.0	39.7	30	69	1	16.1	42.6	85	7	3
DT 316		58.5	33.4	4	93	3	16.8	40.9	87	6	3
DT 317		58.5	35.2	17	81	2	18.0	41.6	99	5	4

1/ Unofficial
2/ 14% Moisture Basis
3/ Unpurified
4/ Below 80 color score not acceptable. S - Specky, V - Very.
5/ Refer to Reference Mixograms for numerical curve pattern.
6/ 1 - No Promise, 2 - Little Promise, 3 - Some Promise, 4 - Good Promise.

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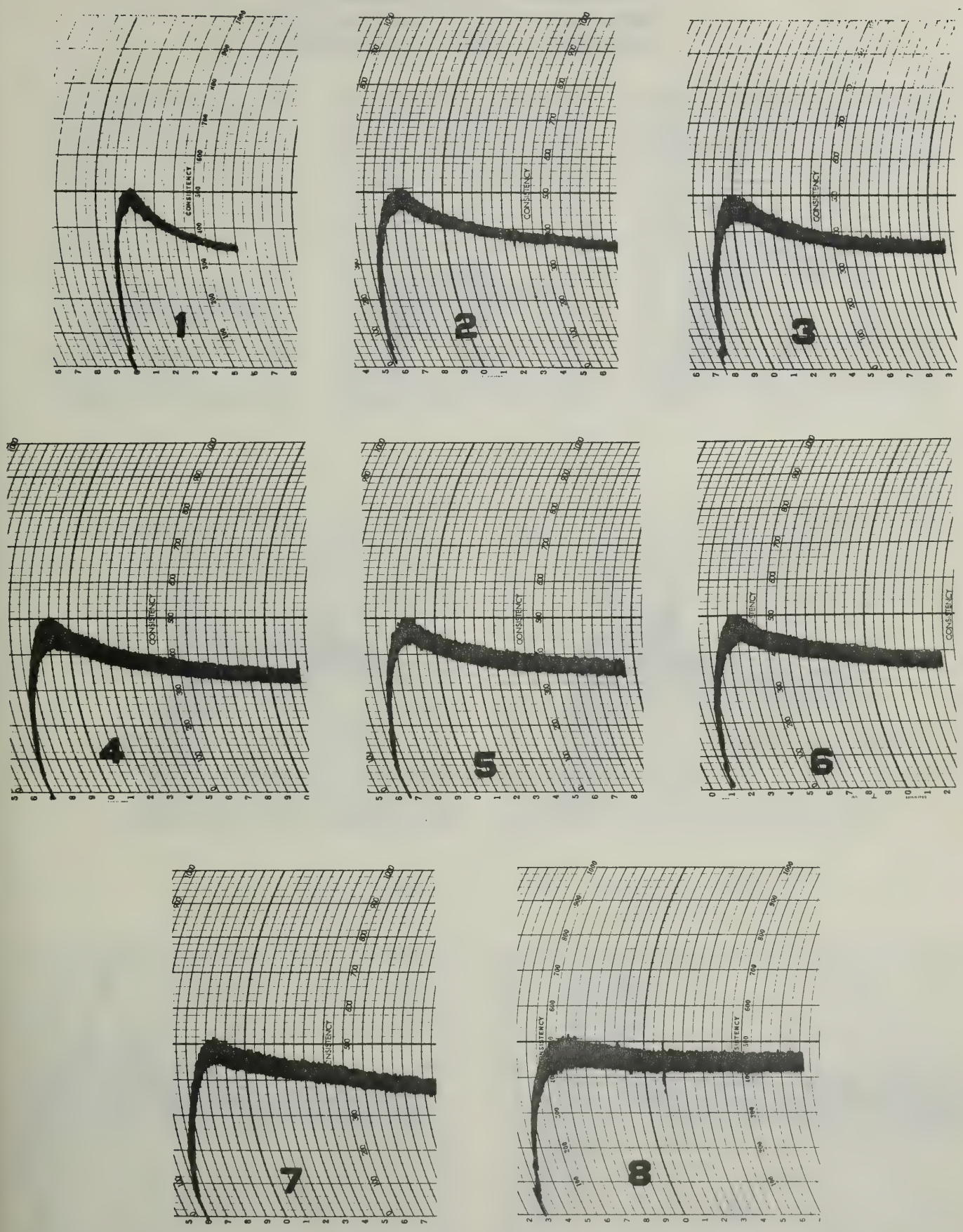

REFERENCE FARINOGRAMS
DURUM WHEAT

NORTH DAKOTA STATE UNIVERSITY
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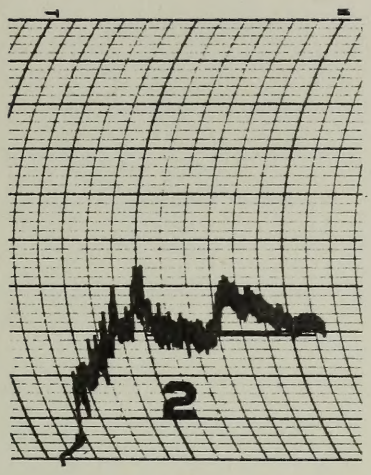
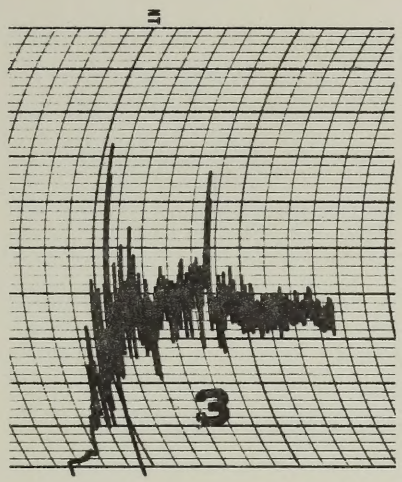
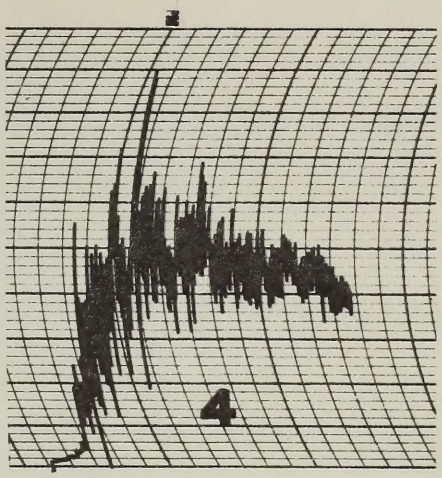
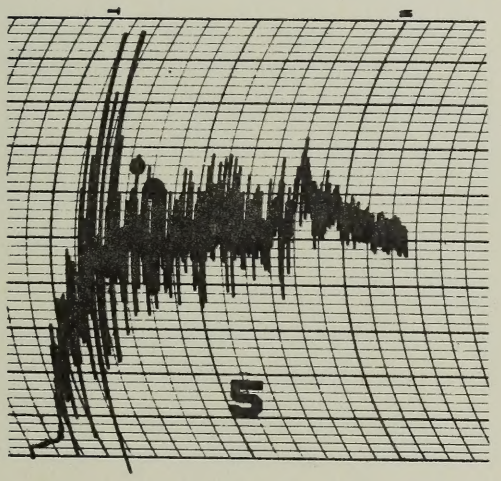
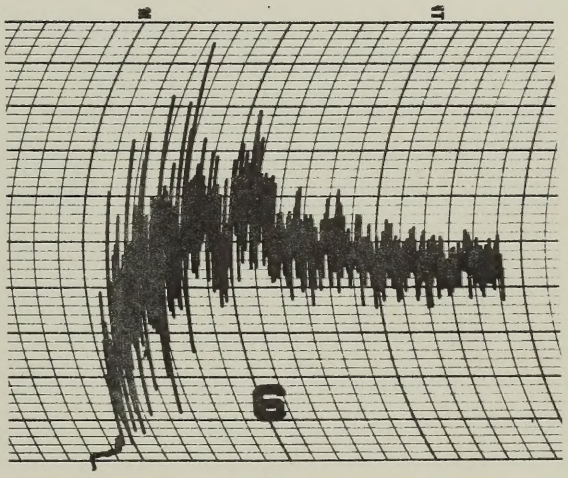
DEPARTMENT OF CEREAL TECHNOLOGY

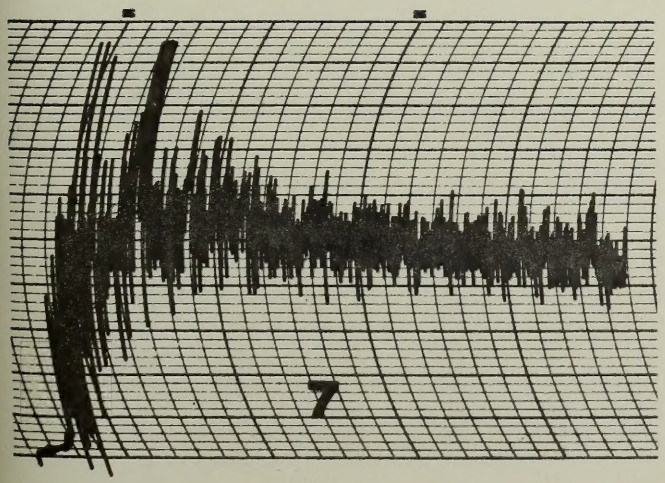


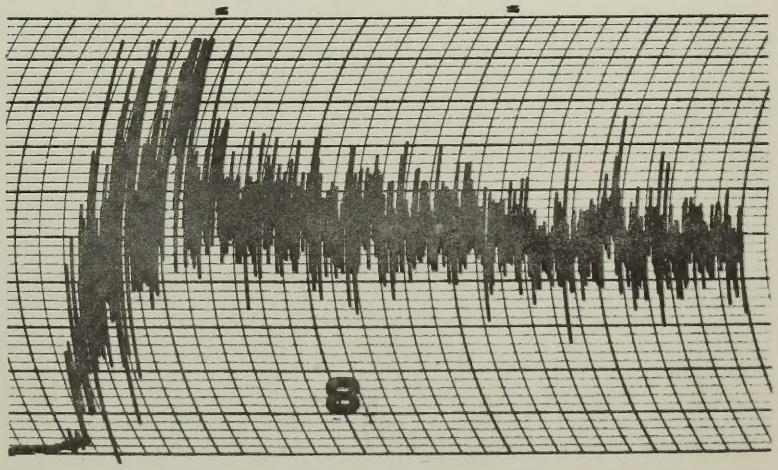












REFERENCE MIXOGRAMS
DURUM WHEAT